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ABSTRACT

This paper presents the results of a study designed to determine whether preservice elementary teachers with a great deal of previous early field experience, but no previous microteaching experience, would benefit more from an additional science field experience in the local school systems or from an alternative science microteaching experience. Results showed that the microteaching group scored significantly better than the field experience group on three of the five instruments used to measure outcomes of the study. They scored significantly better on measures of science teaching skills, attitudes toward science, and science process skills. There were no significant differences between groups on measures of attitudes toward teaching science or on concerns about teaching science. The study concludes that integrating science microteaching with field experience in undergraduate methods courses is superior in developing science teacher skills, attitudes toward science, and science process skills than field experience alone. The lace of significant differences between groups on the measures of attitudes toward teaching science and science teacher concerns indicates that these attitudes and concerns are at least not negatively affected when field experience is somewhat decreased in order to implement a microteaching program. (Author/CW)

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THE RELATIVE EFFECTS OF MICROTEACHING AND FIELD EXPERIENCE ON PRESERVICE TEACHERS

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ABSTRACT

This paper presents the results of a study designed to determine whether preservice elementary teachers with a great deal of previous early field experience but no previous microteaching experience would benefit more from an additional science field experience in the local school systems or from an alternative science microteaching experience. Previous studies have shown how both practices independently are beneficial to preservice teachers but little previous work has been done to determine whether these two methods interact or complement each other when combined in a teacher training program. Subjects for the investigation were enrolled in two sections of an elementary science methods course. Subjects were randomly assigned to an experimental (microteaching) group and a control (field experience) group.

At the end of the treatment, which lasted a full semester, students were evaluated on four outcome measures selected because of common use in previous investigations in these fields. These included teaching behaviors rated from video tapes made of all students teaching a lesson at the end of the semester. Lessons were rated on an instrument developed for this investigation. Other instruments included one to measure science process skills, attitudes toward science and science teaching, and a measure of student concerns about teaching science.

Mean differences on these research instruments were analysed by means of t-test procedures. Results showed that the microteaching group scored significantly better than the field experience group on three of the five instruments used to measure outcomes of the study. They scored significantly better on measures of science teaching skills, attitudes toward science, and science process skills. There were no significant differences between groups on measures of attitudes toward teaching science or on concerns about teaching science.

The study concludes that integrating science microteaching with field experience in undergraduate methods courses is superior in developing science teacher skills, attitudes toward science, and science process skills than field experience alone. The lack of significant differences between groups on the measures of attitudes toward teaching science and science teacher concerns indicates that these attitudes and concerns are at least not negatively affected when field experience is somewhat decreased in order to implement a microteaching program.

The study also suggests a need for further study of feedback systems in both practice teaching methods. The need to determine an efficient balance between the amount of field experience and microteaching utilized in undergraduate programs is also discussed.

The Relative Effects of Microteaching and Field Experience on Preservice Teachers

Purpose of Study

In the United States most higher education institutions currently use early field experiences as a part of preservice teacher training. Many of these institutions use field experience exclusively for practice of teaching skills prior to student teaching. Many schools have also utilized the practice of peer microteaching to aid preservice teachers in practicing these skills. While many schools utilize both methods of teacher training, little study has been done to determine how these practices compare or interact with one another.

The purpose of this study was to determine whether students with a great deal of early field experience but no microteaching experience would benefit more from another field experience in the local school system or from an alternative microteaching experience. The alternative experience consisted of a peer teaching treatment in which they both taught science lessons to peers and observed their peers teaching similar lessons. All microteaching lessons were video taped and students were required to view and rate their lesson immediately after teaching it. None of the subjects in either the experimental (microteaching) group or the control (field experience) group had any prior experience in peer microteaching.

The subjects of this study were preservice elementary teachers enrolled in two sections of an elementary science methods course. These students were primarily seniors who had completed most of their formal coursework and were preparing to student

teach the following semester. Many of the previous courses taken by these students included a major field experience component. A typical field experience comprises approximately one third of the content of a three credit course. The students in both groups had completed an average of six courses with a required field experience component. The range was from three to nine previous field experiences. The present science methods course is part of a methods block also including methods in math and social studies. In this "block" students typically participate in a total of three additional related field experiences. Each field experience comprises approximately one third of the content of the associated course.

Theoretical Basis for Study

Both microteaching and field experience have been rapidly expanding practices since the early 1960's. Microteaching had its impetus at Stanford University in 1963 (Allen & Clark, 1967). Since its inception a number of studies have shown that it is an effective means of improving preservice teachers' teaching skills (Borg, 1969; Davis & Smoot, 1970; Fortune, Cooper & Allen, 1967; McDonald & Allen, 1967; Morse & Davis, 1970; Reed, VanMondfrans & Orme, 1970; Yeany, 1978). Several studies have also attempted to determine the effects of microteaching on preservice teacher attitudes (Ashlock, 1967; Sparks, 1965; Sparks & McCallon, 1974). The results with attitude measures have been inconclusive and somewhat contradictory. A study by Yeany, Okey and Capie (1978) established a relationship between science process skills and teaching behaviors.

Field experience as a practice in teacher preparation is an

outgrowth of the long-standing practice of student teaching. Early promoters of field experience sighted the almost unquestioned success of practice teaching during student teaching as justification of expansion of the activity to early field experience (Conant,1963; Conant, 1964; Hunter & Amidon, 1966). A recent meta-analysis of early field experiences (Malone, 1984a) has shown that field experiences have a modest but consistently positive effect on various measures of teaching related attitudes, teaching behaviors, and delayed outcomes such as later employment, job satisfaction, and teaching behaviors during student teaching. Field experiences' effect on teaching behaviors proved to be especially promising in science and other methods courses. Fuller (1969) hypothesized that students' concern about teaching evolve during and are affected by field experiences and student teaching. Several studies exploring the effect of field experiences on teacher concerns have shown somewhat mixed results (Newlove, 1966; Harp, 1971; Krustchinsky, 1979; Nelson, 1979; Malone, 1984b).

To date no study prior to the one described in this proposal has attempted to determine if there is an interaction between these two major practices. It is the hypothesis of this study that field experiences and microteaching both add unique benefits to preservice teacher training and that students receiving both treatments will benefit more than those receiving only field experience during their training. The major outcome measures commonly studied in both areas - teaching behaviors, attitudes, process skills and teacher concerns - have been included as dependent variables in this study.

Procedures of Study

This study follows the Posttest-Only Control Group Design. A true random assignment was made of all subjects to experimental and control group . This required random assignment to all courses within the methods "block". Subjects in the experimental group had previous experiences with early field experience and received only microteaching as a component of the science methods course. They did continue, however, to receive field experience associated with their math and social studies methods courses. The microteaching experience required their teaching of three activity oriented elementary science lessons to groups of their peers. During the experience they were given feedback from their peers on a rating form devised for the study. They were also required to view themselves on a video recording of their lesson and rate their own lesson and teaching behaviors. In some cases subjects were given informal feedback from a teaching assistant who was filming all lessons. In addition they were required to participate in and rate the lessons of twelve peers from within the the experimental group.

Subjects in the control group took part in the methods "block" field experience typically offered at the university. In place of microteaching this group taught six elementary science lessons in the local public school system. These lessons were typically taught to approximately half to one third of a full elementary school classroom. In some cases students were given informal feedback from a teaching assistant assigned to supervise the "block" program. No systematic feedback was given to these subjects.

At the end of the investigation, which lasted a full semester, the students were evaluated on all outcome measures listed above. A final video taped science lesson was taught to peers by both the experimental and control groups. These taped lessons were rated in terms of science teaching behaviors on an instrument developed for the study, the Inquiry Teaching Behaviors Instrument (ITBI). The ITBI is a Likert rating scale used by a trained observer to classify teaching behaviors, observed from video tape, in four major areas. Subjects were rated on 22 specific behaviors in the areas of communication skills, questioning skills, classroom management skills, and use of manipulative materials. Process skills were measured by the Test of Integrated Process Skills II (TIPS II) developed by Burns, Wise, and Okey (1983). In addition all subjects were assessed on the two major scales of the Scientific Attitude Inventory (Moore & Sutman, 1970). These scales, the Science Attitude Scale (SAS) and the Science Teaching Attitude Scales (STAS), assess attitudes toward science and science teaching respectively. Teaching concerns were rated by use of the Teacher Concerns Questionnaire (TCQ) (George, 1978).

Differences between groups on the various outcome measures were analyzed through the use of a t-test. Because both groups received treatments which have been shown in the literature to be effective in bringing about changes in the types of outcomes chosen for this study, mean differences on the various outcome measures between groups were expected to be smaller than might be expected from pretest to posttest or if the control group had received no treatment. Because this study is interested in these

smaller incremental gains, and because the number of subjects available was small, significance levels for all hypotheses tested were set a priori at the .10 alpha level as an acceptable risk of a type I error.

Results of Study

Results of t-tests on the Inquiry Teaching Behavior Instrument (ITBI) indicated significant differences between groups on the overall test ($t = 2.00$, $p < .05$) and on two of the four subtests - communication skills ($t = 2.06$, $p < .05$) and use of manipulative materials ($t = 1.95$, $p < .05$). Group mean differences favored the experimental (microteaching) group on the overall test and on all subscales. (See Tables I & II.)

Insert Table I & II about here

Results on the Test of Integrated Process Skills II (TIPS II) indicated that there were significant differences between groups ($t = 1.69$, $p < .10$). These mean differences indicate that the experimental group had scored higher than the control group on this skills measure. (See Table I.)

Results on the SAS scales of the Scientific Attitude Inventory measuring attitudes toward science indicated that subjects in the experimental group had significantly more positive attitudes toward science ($t = 2.38$, $p < .05$) at the end of the treatment. Attitude differences between groups were greatest on

Subscale 2 ($t = 3.51$, $p < .01$) which assesses attitudes toward science's limitations in explaining natural phenomena. (See Table I & III.)

Insert Table III about here

Results on the Science Teaching Attitude Scales (STAS) measuring attitudes toward teaching science ($t = 0.18$, $p > .10$) and on the Teacher Concerns Questionnaire (TCQ) measuring concerns about teaching science ($t = 0.25$, $p > .10$) indicated no significant differences between groups. (See Table I.)

Implications for Science Teaching

The results of this study indicate that inclusion of a combination of microteaching with field experience in undergraduate elementary science methods courses is superior in developing science teacher skills, attitudes toward science, and science process skills than field experience alone. While no differences on outcomes measuring attitudes toward teaching science or concerns about teaching science were identified by the study, the study has at least shown that these attitudes and concerns are not negatively affected when field experience is somewhat decreased in order to implement microteaching in a program.

Additional study will be required to explore the relationship of microteaching and field experience. Other questions about the relationship of the two practices still to be answered are: (1) How can supervision of the programs be used efficiently to enhance

their impact? (2) Is it microteaching itself or the enhanced feedback it provides that improves student outcomes? (3) Does training cooperating teachers in the goals of the preservice program increase the impact of the program on preservice teachers?

This study is the first to inquire into a calculated balance between the two practices of microteaching and field experience in teacher education. As field experience in teacher education is not unique to science teacher education this study has possible implications for other branches of teacher education. More study is needed concerning the relationship of these two practices, specifically to determine the optimum balance between them. The investigation deleted field experience form one course to accomodate adding microteaching to that course. The students involved were concurrently participating in field experiences in two other courses and had previous exposure to field experience. It is possible that further decreasing field experience to accomodate microteaching in a teacher education program may show even greater gains.

The balance between these practices could be studied separately or by combining them in novel ways to create new systems. One such combination, currently being developed and tested at Louisiana State University, is called Macroteaching. Under this system compact, one piece video camera/recorders are placed in schools where preservice teachers can record themselves teaching lessons to students. At a convenient time after the lesson, students can view themselves teaching and/or have a university supervisor critique their lesson. Macroteaching can also be combined with traditional microteaching by having students

first teach a lesson to peers in a microteaching lab and later teach and record the same lesson with students in a field setting.

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Table I

T-test Summary for Five Outcome Measures

Instrument	$\bar{X}$	n	sd	t	df
ITBI					
experimental	81.31	16	18.05	2.00**	28
control	66.71	14	21.84		
TIPS II					
experimental	29.19	16	3.98	1.68*	28
control	26.71	14	4.10		
SAS					
experimental	121.69	16	6.52	2.38**	28
control	116.75	14	4.50		
STAS					
experimental	86.69	16	7.10	0.18	28
control	87.14	14	6.64		
TCQ					
experimental	100.31	16	26.44	0.25	28
control	98.29	14	14.79		

*$p \leq .10$
**$p \leq .05$

Table II

T-test Summary for the Inquiry Teaching Behaviors Instrument (ITBI) Subscales

Subscale Skills	$\bar{X}$	n	sd	t	df
Communication					
experimental	20.50	16	5.20	2.06**	28
control	16.00	14	6.77		
Questioning					
experimental	14.56	16	3.79	1.41	28
control	12.29	14	5.04		
Management					
experimental	23.06	16	5.37	1.59	28
control	19.71	14	6.14		
Material Use					
experimental	23.19	16	5.80	1.95**	28
control	18.71	14	6.78		

*p < .10
**p < .05

Table III

T-test Summary for Science Attitude Scales - (Subscales 1 through 4)

Science Attitudes	$\bar{X}$	n	sd	t	df
Subscale 1					
experimental	30.63	16	2.87	0.72	28
control	29.86	14	2.98		
Subscale 2					
experimental	33.94	16	3.00	3.51***	28
control	30.61	14	2.20		
Subscale 3					
experimental	25.38	16	1.93	0.02	28
control	25.36	14	2.10		
Subscale 4					
experimental	31.75	16	2.82	0.91	28
control	30.93	14	1.98		

*p < .10
**p < .05
***p < .01